OPERATING INSTRUCTION MANUAL

Telonic®

MODEL L5-X/M5-X SERIAL #3359

SWEEP, C.W. & MARKER GENERATOR

TELONIC INDUSTRIES, INC. BEECH GROVE, INDIANA

SPECIFICATIONS ON MODEL L5-X/M5-X

SWEEP GENERATOR SECTION - L5-X

CENTER FREQUENCY	20-40 mc.
SWEEP WIDTH	0-40%
FLATNESS	Within .5 db for 10 mc. band
SWEEP RATE	60 cps.
OUTPUT	Min. 1.0 V RMS into 50 ohms (metered).
ATTENUATION	Toggle Switch 0-121 db. in 1 db. steps plus vernier attenuation 0-10 db.
LEAKAGE	To permit ateenuation to 1 microvolt.
ZERO BASE LINE	
HORIZONTAL OUTPUT	Approx. 40 V.
POWER	110-120 V. 60 cps.
MARKER SYSTEM	
Birdy-By-Pass Marker Circuitry	The output of the marker oscillators mixed with a signal from the sweep oscillator to produce beat-notes or birdies. These are amplified and super-imposed upon the detected RF output signal before it is applied to vertical scope input.
Harmonic Markers	Crystal-controlled harmonic markers spaced every 1.0 mc. across teh whole band.

The two CW generators function as variable markers.

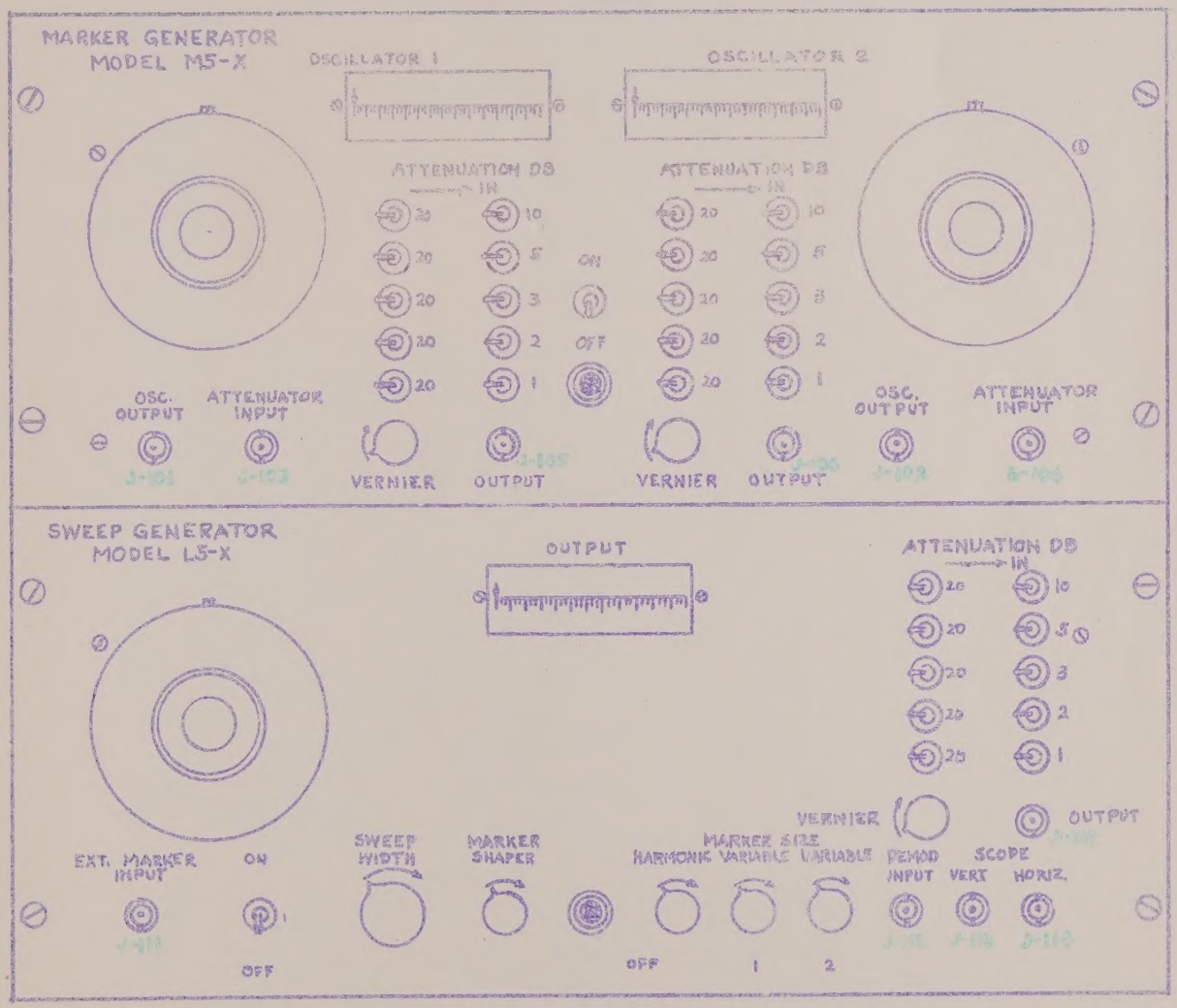
PHYSICAL DESCRIPTION	8 3/4" X 19" Panel

CW GENERATOR SECTION - M5-X

FREQUENCY	20-40 mc. - Calibration every .25 mc. Accuracy -- .25%
STABILITY	.1%
OUTPUT	1.0 V RMS min. into 50 ohm load (metered) gain control
SEPARATE ATTENUATORS	Toggle switch 0-121 db. in 1 db. steps.
VERNIER ATTENUATION	0-10 db.
LEAKAGE	To permit attenuation to 1 microvolt.
PHYSICAL DESCRIPTION	8 3/4" X 19" Panel

NOTE: PROVISION FOR EXTERNAL USE OF ATTENUATOR ON M5-X

PICTORIAL DIAGRAM OF FRONT PANEL



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OPERATING INSTRUCTION MANUAL

MODEL L5-X

SERIAL _____

SWEEP GENERATOR

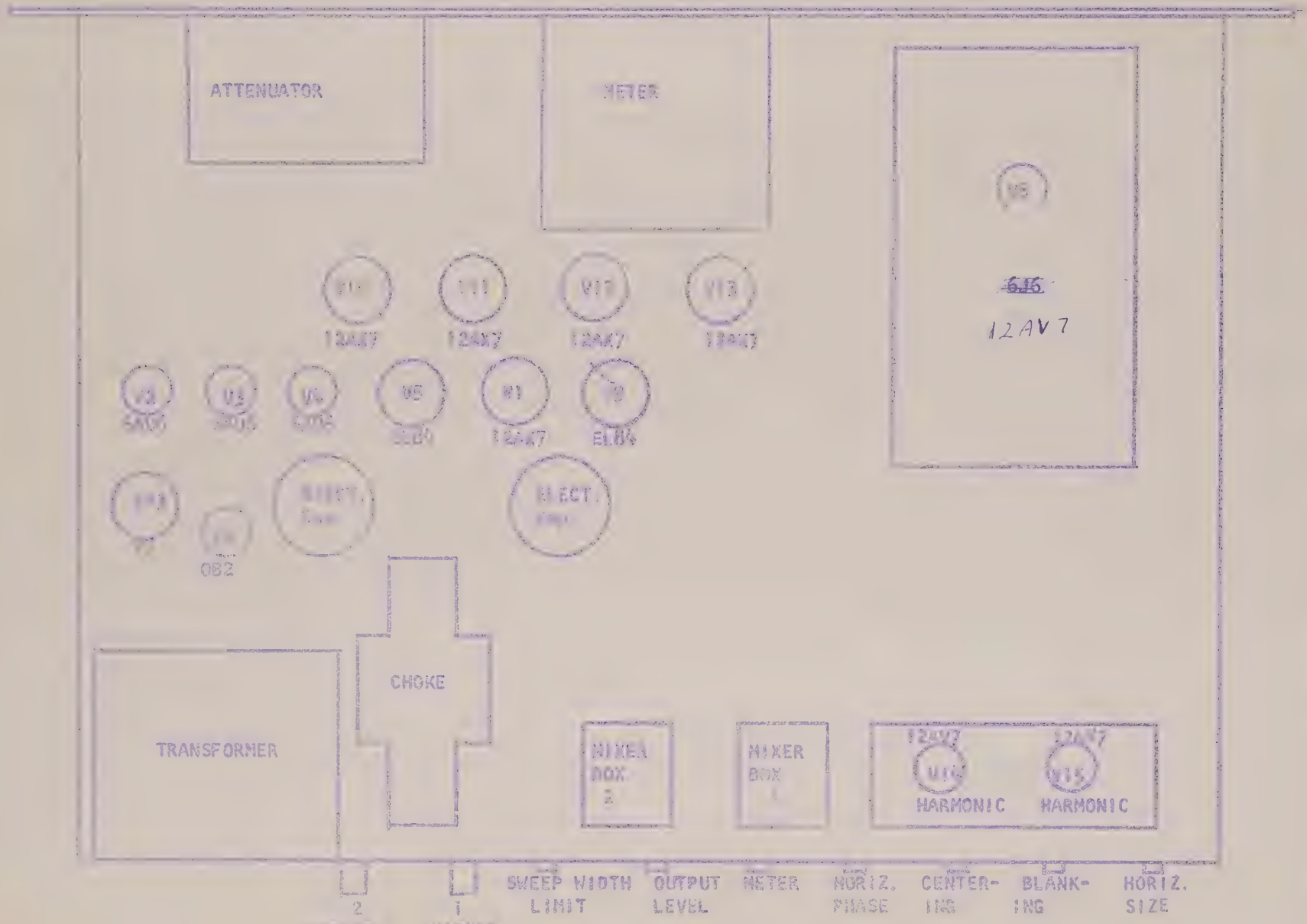
TELONIC INDUSTRIES, INC. BEECH GROVE, IND.

MODEL [illegible]

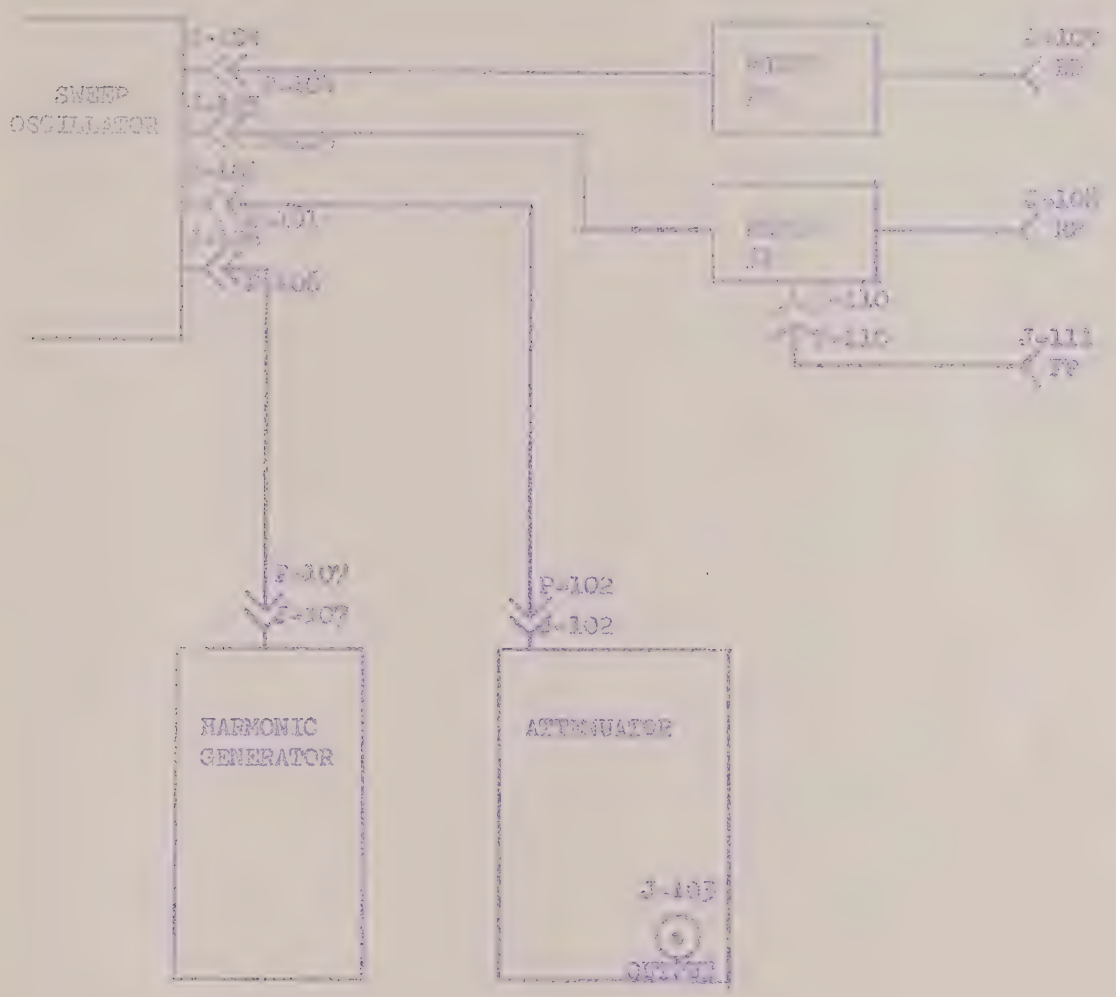
DESCRIPTION OF FRONT PANEL

SWEEP DIAL	Approximately center frequency of sweep.
ATTENUATOR	Toggle switch attenuator provides indicated amounts of attenuation.
VERNIER ATTENUATION	10 db. of vernier attenuation.
OUTPUT	Sweep output 50 ohms (BNC Connector)
OUTPUT METER	Indicates the output voltage supplied to the Toggle Switch attenuator from the vernier attenuator.
EXTERNAL MARKER INPUT	Marker input for external signal source.
POWER ON/OFF	Power switch.
SWEEP WIDTH	This potentiometer is used to vary the amount of voltage supplied to the variable inductance and can be used to adjust the sweep width.
MARKER SHAPER	Varies the width of the marker signals.
PILOT LIGHT	Use #47 bulb for replacement.
MARKER SIZE	
HARMONIC	Varies the amplitude of the harmonic markers and turns marker off in the extreme counter clockwise position.
VARIABLE 1	Varies the amplitude of the marker signals from oscillator 1 in the Marker Generator unit and the external marker input.
VARIABLE 2	Varies the amplitude of the marker signals from oscillator 2 in the marker generator.
DEMODULATED INPUT	The demodulated signal from the device being swept is fed into this connector so that marker signals may be superimposed.
SCOPE	
VERTICAL	This connector should be connected to the vertical input terminals of the scope for viewing the demodulated signals and markers.
HORIZONTAL	These terminals are connected to the scope horizontal amplifier input. Using the waveform at these terminals will produce a more linear and more stable presentation than by using the internal horizontal drive of the scope.

CHASSIS LAYOUT



COAXIAL CABLE DIAGRAM FOR L5-X SWEEP GENERATOR

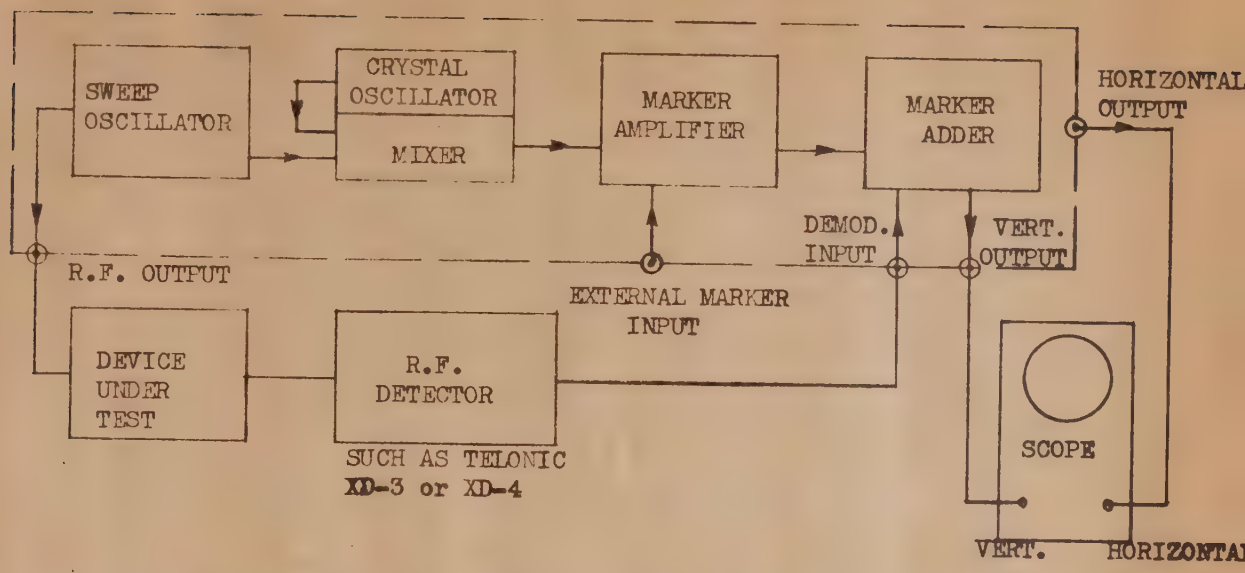


DESCRIPTION OF REAR PANEL

CENTERING	Controls the average current through the saturable inductance control winding. It is generally set for best linearity when operating at maximum sweep width, which is approximately 23 ma. for this model, when the front panel centering control is maximum clockwise.
BLANKING WIDTH	This potentiometer is the grid resistor for the blanking pulse amplifier (V2). It is adjusted to blank slightly more than one-half of the sweep cycle to produce a zero base line.
SWEEP WIDTH LEVEL	For adjusting the maximum amplitude of the sawtooth drive to the saturable inductance.
OUTPUT LEVEL	Controls the average B plus voltage supplied to the sweep oscillator and is adjusted for maximum leveled output voltage.
HORIZONTAL PHASE	Adjusts the sweep and horizontal phase in reference to the phase of the blanking pulse.
FUSE	Use 2 amp. 3AG fuse for replacement.
HORIZONTAL SIZE	Adjust the horizontal size.
METER	Used to calibrate meter.
MARKER INPUT 1	A small % of the output from Marker 1 is fed into this BNC connector.
MARKER INPUT 2	A small % of the output from Marker 2 is fed into this BNC connector.

OPERATING INSTRUCTIONS

TYPICAL SET-UP



The following procedure is recommended for setting up this instrument in test position.

1. Connect unit to 110/120 v., 50/60 cps. supply and switch power on.

2. Make connections to detector and oscilloscope as shown above, omitting the "device under test".

3. Set vernier attenuator to maximum and switch attenuator steps out (downward).

4. Let sweep width to maximum (clockwise).

5. Turn Marker Switches on (up) or inject external CW signal to produce a marker.

6. Rotate SIZE control clockwise until markers are of convenient size.

   REAR PANEL CONTROLS are adjusted at factory and instrument is ready to use. However, should it be desirable to check these adjustments, follow these steps.

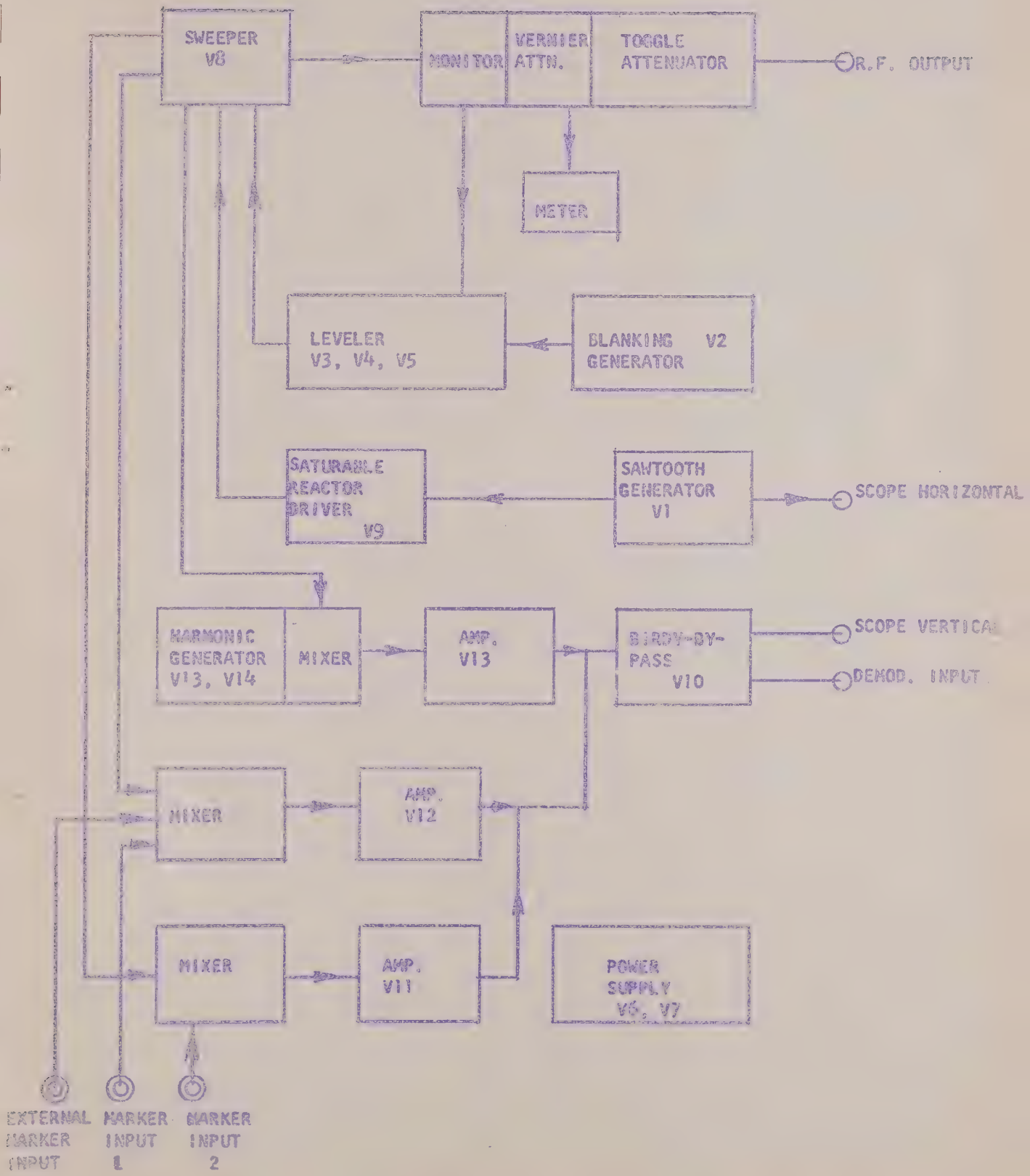
7. Adjust horizontal phase and Blanking Width to produce a rectangular pattern on scope.

8. Adjust the OUTPUT LEVEL control (R.P.) for maximum Leveled Out-Put at the low frequency end of band.

9. The SWEEP WIDTH may be used to limit the sweep width.

10. CENTERING may be used to adjust the center frequency.

BLOCK DIAGRAM



GENERAL DESCRIPTION

BLANKING AND HORIZONTAL CIRCUITRY

The blanking and horizontal sweep voltages are originated by square wave producing circuits. The 6.3 v. filament and the 6.3 v. pilot lamp winding of the power transformer are connected in series to obtain a 12.6 volt C.T. to ground. This voltage is connected through the blanking adjustment to one of the grids of the 12AX7 and to the grid of the 6AU6.

The square wave output of the 6AU6 controls the 12AY7 sweep oscillator voltage regulator tube and thus deprives the tuned oscillator of voltage during ½ of each cycle. The phase of this blanking voltage is adjusted by the rear panel control so that the lowest frequency being swept is located at the left of the scope presentation. The square wave output of one triode of the 12AX7 is applied to the other triode through an RC network. This is designed to produce a linear sawtooth waveform.

The second triode is connected as cathode follower and produces the low impedance sawtooth output. This horizontal sweep voltage is used to produce the frequency sweep. An RC network connecting this triode to the horizontal amplifier distorts this sawtooth. The linearity control on the rear panel is part of this network. It is adjusted for best display linearity.

AUTOMATIC OUTPUT LEVELING CIRCUITRY

A sample of the sweep oscillator output, at the input to the ATTENUATOR, is detected and amplified and is used to control the plate voltage of the sweep oscillator. The OUTPUT LEVEL control adjusts the bias on the first stage of the amplifier. This causes the DC levels in the entire amplifier to change and varies the average B plus supplied to the sweep oscillator from a minimum of 25 v. to over 100 v.. A small decrease in the sampling voltage causes a large increase in the B plus supplied to the sweep oscillator and thus counteracts any amplitude variation of the oscillator is tuned over the range.

The operation of this circuit and of the sweep oscillator can be checked at the feed-thru capacitor on the end of the attenuator box or Pin 1 of V2. The waveform at this point will normally show a flat output level over the entire band. Adjusting the OUTPUT LEVEL will change this level.

MAINTENANCE

By use of the schmeatic, operational diagram and the terminal board layout, voltage and waveforms, ordinary difficulties can be readily located and remedied. The following trouble-shooting chart is an attitional aid to servicing:

SYMPTOMS	POSSIBLE CAUSES & REMEDIES
Pilot light off and unit fails to operate	Fuse open---replace If 2nd fuse open---look for cause of overload, shorted wiring, components etc. (The 2-47 ohm 1 watt resistors on terminal board burn out if the B/ circuit is overloaded and this protects the rectifier and transformer).
No Horizontal Output	Look for difficulty in the sawtooth circuitry V1 using terminal board layout and schematic to check waveforms and voltages.
R. F. Output is Low or Zero	Check B/ to sweep oscillator - P. 3 (V5). It should be a square wave of 25-100 v. of positive polarity and should vary as the output level control varies. If it is normal, look for RF difficulties---bad tube, shorted or open wiring, defective components, etc. If the voltage is low and does not respond to the leveler control, remove first V4 and then V2. When either of these tubes conducts, the voltage on grid of V5 (Pin 2) is reduced and thus decreases the B/ to the sweep oscillator. If removal of V2 allows the B/ on V5 (Pin 3) to return to normal, check the blanking width control, the tube and associated circuitry. If removal of V4 causes the B/ to return to normal, check the leveler controls, V3 and V4 and circuitry.

MAINTENANCE (CONTINUED)

SYMPTOMS	POSSIBLE CAUSES & REMEDIES
Poor Leveling	Replace diodes D603 & D604 (1N34) in attenuator box observing polarity. Leveler circuit requires negative control voltage so the plate of the diode should be connected to the feed-thru capacitor. Also, try replacing V4, V3. V3 is most critical since it is in the first stage of the D. C. coupled amplifier. Resetting of the rear panel output level controls is necessary if V3 is changed.
Weak Harmonic Markers	Replace 1N82 crystal mixer inside the harmonic generator observing proper polarity as shown on schematic.
Weak Variable Marker 1 or 2	Replace 1N82 crystal mixer in marker mixer for 1 or 2.

METER CALIBRATION

Since the sweep oscillator is off 80% of the time, a power output of 10 milliwatts corresponds to 1 volt R. M. S. To calibrate the meter, the rear panel adjustment is made to cause the meter to read 1.0 V. R. M. S. when an output power of 10 milliwatts is read on a HP-430C, or equivalent, power meter.

TUBES

CIRCUIT REF. #	TYPE	DESCRIPTION
V1	12AX7	Horizontal Sweep Generator
V2	6AH6	Blanking Generator
V3	6AU6	Leveler
V4	6AS6	Leveler
V5	OA2/150C5	Sweep Oscillator Voltage Regulator
V6	OB2	B+ Voltage Regulator
V7	5Y3GT	B+ Supply Rectifier
V8	6J6	Tuneable Sweep Oscillator
V9	OB2/150C5	Saturable reactor Voltage Regulator
V10	12AX7	Marker Amplifier
V11	12AX7	Birdy-By-Pass Amplifier
V12	12AX7	" " " "
V13	12AX7	" " " "
V14	12AV7	Harmonic Generator
V15	12AV7	" "

DIODES

CIRCUIT REF. #	DESCRIPTION	
D601	1N34	Attenuator
D602	"	"
D603	"	"
D604	"	"
D901	"	Mixer #1
D902	"	" #2
D1001	1N82	Harmonic Generator

CAPACITORS

CIRCUIT REF. #	DESCRIPTION
C1A	10mf.-450 V. Electrolytic
C1B	100 mf.-450 V. "
C1C	25 mf.-50 V. "
C101	.1mf.
C102	.01 mf.
C103	.1 mf.
C201	.1 mf.
C202	.01 mf.
C501	.01 mf.
C503	1000 mmf.
C601	5 mmf.
C602	5 mmf.
C603	10 mmf.
C604	15 mmf.
C605	1000 mmf
C606	.01 mf

PARTS LIST - L5-X

CAPACITORS - CONT.

CIRCUIT REF. #	DESCRIPTION
C607	15 mmf.
C608	1000 mmf feed thru
C609	1000 " " "
C701	1000 " " "
C702	1000 " " "
C703	1000 " " "
C704	1000 " " "
C705	1000 " " "
C706	1000 " " "
C707	10 mmf.
C708	10 mmf.
C709	175 mmf. dual
C801	.01 mf.
C802	.01 mf
C803	.01 mf
C804	1000 mmf.
C805	1000 mmf.
C806	.01 mf.
C807	.01 mf.
C808	120 mmf.
C809	120 mmf.
C810	10 mf.
C901	25 mmf.

CIRCUIT REF. #	DESCRIPTION
C902	25 mmf.
C903	25 mmf.
C904	1000 mmf-feed thru
C905	" " " "
C1001	" " " "
C1002	" " " "
C1003	" " "(Test Point)
C1004	" " "(Test Point)
C1005	" " "(Test Point)
C1006	" " "(Test Point)
C1007	1000 mmf.-feed thru
C1008	" " " "
C1009	" " " "
C1010	1000 mmf.
C1011	25 mmf.
C1012	50 mmf.
C1013	15 mmf.
C1014	1000 mmf.
C1015	15 mmf.
C1016	1000 mmf.
C1017	10 mmf.
C1018	1000 mmf.
C1019	10 mf.

RESISTORS

CIRCUIT REF. #	DESCRIPTION
R10	*12.5 K, 10W
R11	200 ohm, 5 W
R12	47 ohm, ½ W
R13	47 ohm, ½ W
R101	560 K, ½ W
R102	560 K, ½ W
R103	100 K, ½W
R104	2.7 M, ½ W
R105	1 M, ½ W
R106	100 K, ½ W
R107	47 K, ½ W
R301	1 M, ½ W
R302	12 K, 5 W
R303	6 K, 5 W
R304	1 K, ½ W
R305	560 K, ½ W
R306	2.2 K, ½ W
R307	2.2 K, ½ W
R308	39 K, ½ W

CIRCUIT REF. #	DESCRIPTION
R401	[illegible] ohm, ½ W
R501	4.7 M, ½ W
R502	[illegible] M, ½ W
R503	[illegible] K, ½ W
R601	[illegible] ohm, ½ W
R602	" "
R603	" "
R604	" "
R605	790 ohm, ½ W
R606	" "
R607	61 ohm, ½ W
R608	" "
R609	" "
R610	" "
R611	" "
R612	" "
R613	2.7 ohm, ½ W
R614	" "
R615	" "

PARTS LIST - L5-X

RESISTORS (CONT.)

CIRCUIT REF. #	DESCRIPTION
R616	22 ohm, ½ W
R617	75 ohm, ½ W
R618	27 ohm, ½ W
R619	96.5 ohm, ½ W
R620	96.5 ohm, ½ W
R621	71 ohm, ½ W
R622	178 ohm, ½ W
R623	178 ohm, ½ W
R624	292 ohm, ½ W
R625	292 ohm, ½ W
R626	17.6 ohm, ½ W
R627	437 ohm, ½ W
R628	437 ohm, ½ W
R629	437 ohm, ½ W
R630	437 ohm, ½ W
R631	11.6 ohm, ½ W
R632	11.6 ohm, ½ W
R633	870 ohm, ½ W
R634	870 ohm, ½ W
R635	5.8 ohm, ½ W
R636	15 k, ½ W
R637	30.5 ohm. ½ W
R701	10 K, ½ W
R702	10 K, ½ W
R703	220 ohm, ½ W
R704	1 K, ½ W
R705	1 K, ½ W
R801	100 K, ½ W
R802	560 K, ½ W
R803	4.7 K, ½ W
R804	100 K, ½ W
R805	1 K, ½ W
R806	4.7 K, ½ W
R807	100 K, ½ W
R808	1 K, ½ W
R809	4.7 K, ½ W
R810	3.3 K, ½ W
R811	47 K, ½ W
R812	47 K, ½ W
R813	27 K, ½ W
R814	4.7 K, ½ W
R815	100 K, ½ W
R816	47 K, ½ W
R817	20 K, 10 W
R901	56 ohm, ½ W
R902	56 ohm, ½ W
R903	56 ohm, ½ W
R904	56 ohm, ½ W
R905	220 ohm, ½ W
R906	220 ohm, ½ W
R1001	47 K, ½ W
R1002	15 K, ½ W
R1003	15 K, ½ W
R1004	27 K, ½ W
R1005	100 K, ½ W
R1006	120 ohm, ½ W
R1007	27 K, ½ W
R1008	100 K, ½ W
R1009	100 K, ½ W
R1010	27 K, ½ W
R1011	100 K, ½ W
R1012	120 ohm, ½W
R1013	100 K, 2 W
R1014	5 K, 20 W
R1015	51 ohms, ½ W

*Value of component parts subject to adjustment at the factory.

SWITCHES

CIRCUIT REF. #	DESCRIPTION
S1	S. P. S. T. 3 amp -- F. P.
All attenuator switches	D. P. D. T.

PARTS LIST - L5-X

POTENTIOMETERS

CIRCUIT REF. #	DESCRIPTION	
VR101	300 K, ½ W	Horizontal Phase R. P.
VR102	2 M	Horizontal Size R. P.
VR201	2 M, ¼ W	Blanking Phase R. P.
VR301	200 K, ½ W	Level R. P.
VR501	200 K, ½ W	Sweep Limit R. P.
VR502	1 M, ½ W	Sweep Width, R. P.
VR503	1 M, ½ W	Centering R. P.
VR601	100 ohm	Vernier, Attenuation F. P.
VR602	10 K	Meter Adjust R. P.
VR801	1 M	Harmonic Marker F. P.
VR802	1 M	Variable Marker F. P.
VR803	1 M	Variable Marker F. P.
VR804	100 K, ½ W	Marker Shaper

TRANSFORMERS

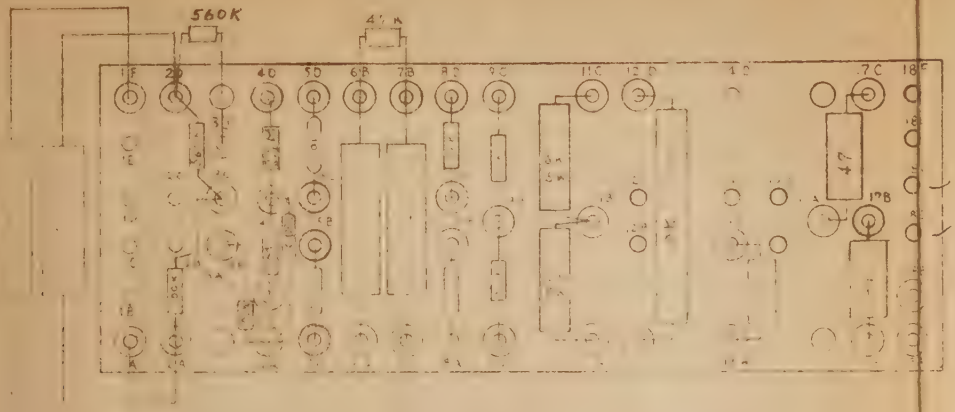
CIRCUIT REF. #	DESCRIPTION
T1	Power Transformer
T2	Saturable Reactor

COILS

CIRCUIT REF. #	DESCRIPTION
L1	Filter Choke
L701	2.2 uh
L702	2.2 uh
L703	Plate Tuning Coil
L704	Plate Tuning Coil
L801	10 mh
L1001	Plate Tuning Coil
L1002	" " "
L1003	" " "
L1004	Coupling Link
L1005	" "
L1006	" "

MISCELLANEOUS

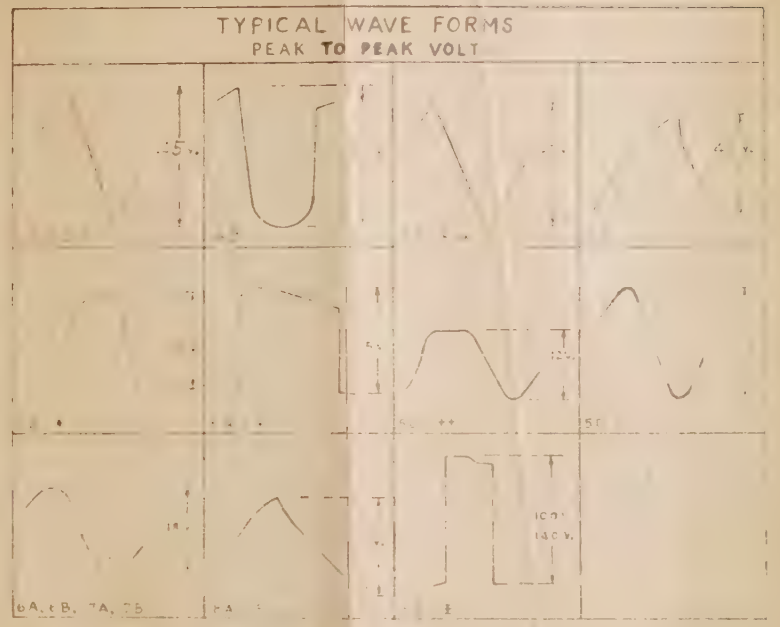
CIRCUIT REF. #	DESCRIPTION
M1	2 amp
M2	#47 Pilot Light
M601	100 ma. Meter
M1001	1 mc. Crystal



VOLTAGE CHART

ALL VOLTAGES TAKEN WITH 20,000 OHM VOLT METER.
OUTPUT LEVEL AND SWEEP WIDTH CONTROLS AT MAXIMUM POSITION.
* VOLTAGE VARIES WITH SETTING OF OUTPUT LEVEL CONTROL.
ALL VOLTAGES MAY VARY ±10%.

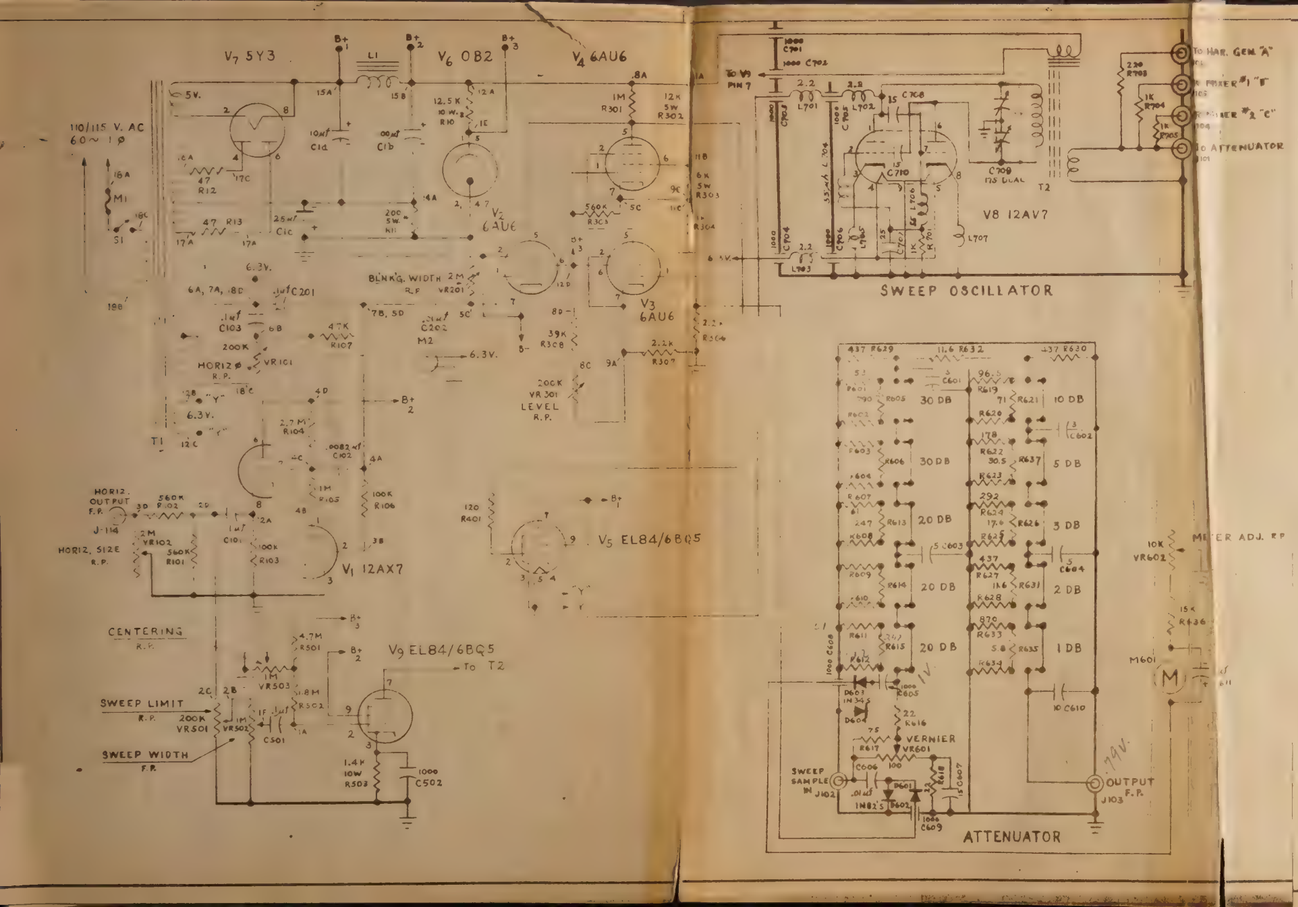
TYPICAL WAVE FORMS
PEAK TO PEAK VOLT

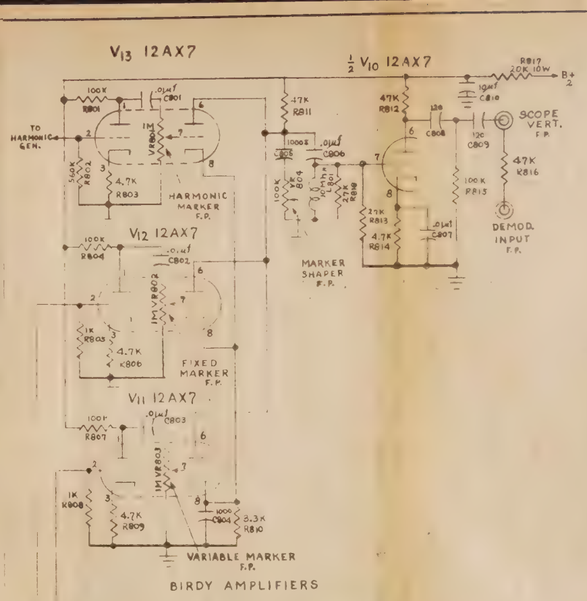


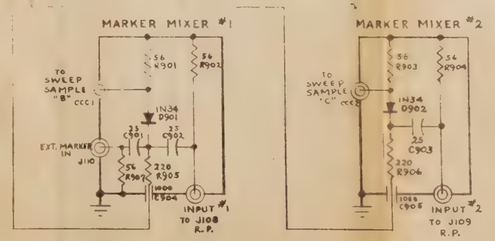
BEST LEVELING AT MAX. OUTPUT. SCOPE SET FOR 60~ SWEEP OF VHF

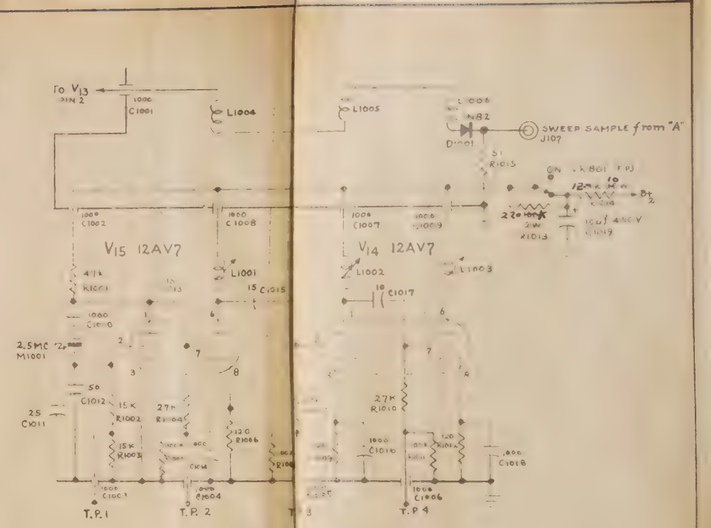
* SIZE VARIES WITH SWEEP WIDTH CONTROL
\# VARIES AMPLITUDE WITH OUTPUT LEVEL CONTROL.
** VARIES AMPLITUDE WITH BLANKING WIDTH CONTROL.
‡ VARIES AMPLITUDE WITH OUTPUT LEVEL CONTROL AND FREQUENCY SETTING

REV. NO.	DATE	Telonic INDUSTRIES 73 N. 2ND. AVE. BEECH GROVE INDIANA			
		L5-X TERMINAL BOARD VOLTAGE LEVELER & POWER SUPPLY			
		SCALE		SHEETS	DRAWING NO.
		DRAWN BY H B Jester	DATE Feb. 14, 1956	SHEET 1	86-3190
		APP'VD BY Rod	DATE		









REVISIONS NO.	DATE

Telonic INDUSTRIES, INC. 73 N. SECOND AVE. BEECH GROVE, IND.

L5-X SWEEP GENERATOR

SCHEMATIC

SCALE		SHEETS	DRAWING. NO.
DRAWN BY H. E. Jester	DATE 4-8-58	SHEET 1	87-1190
APP'VD BY	DATE		

OPERATING INSTRUCTION MANUAL

MODEL M5-X

SERIAL _____

SWEEP GENERATOR

TELONIC INDUSTRIES, INC. BEECH GROVE, IND.

MARKER GENERATOR M5-X

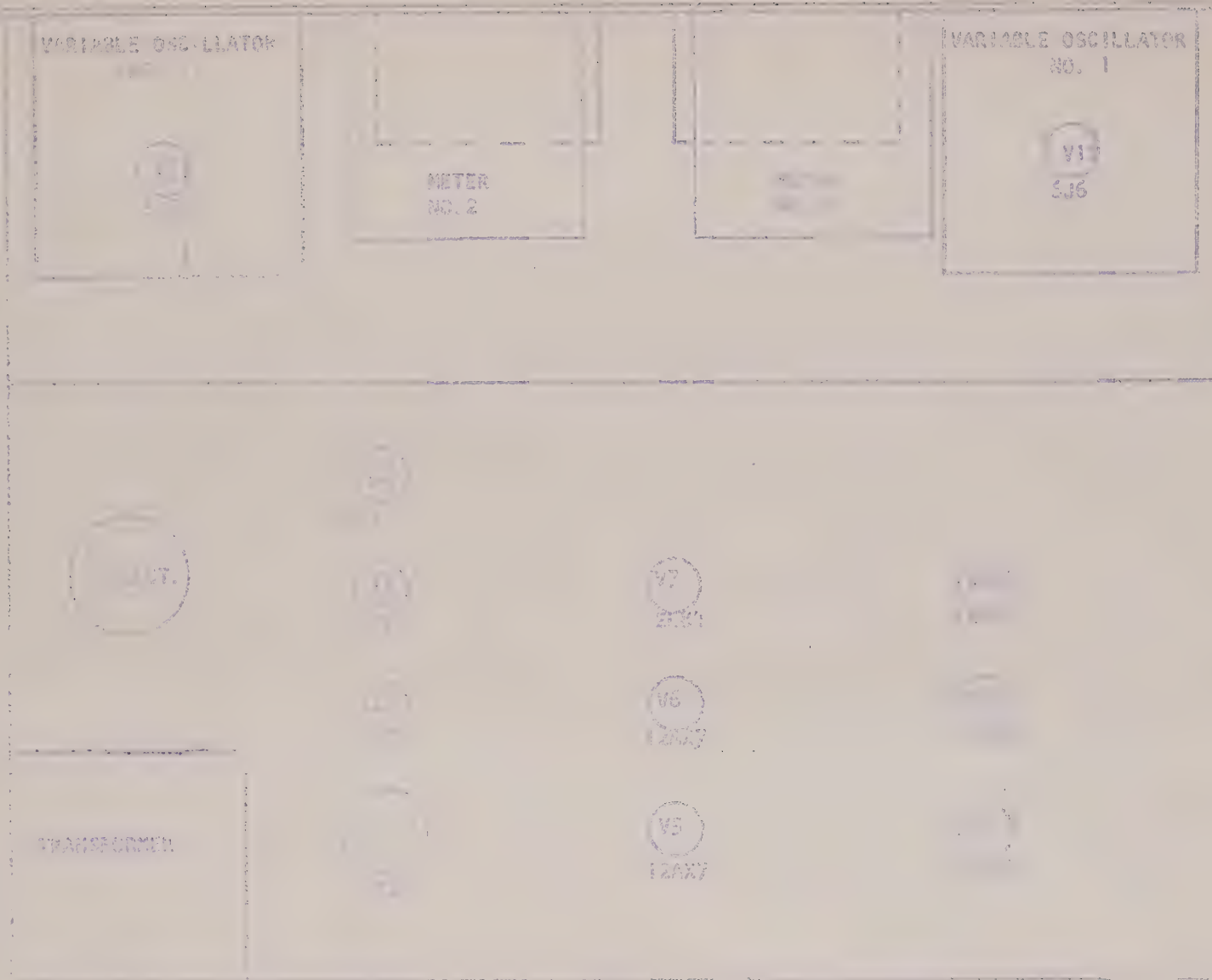
DESCRIPTION OF FRONT PANEL

OSCILLATOR 1

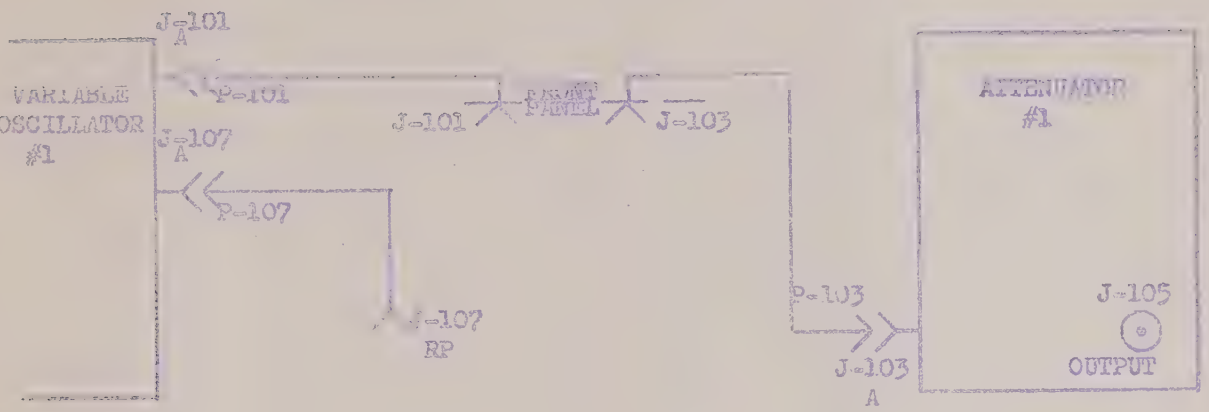
MARKER DIAL	Calibrated dial indicates frequency of marker.
OSCILLATOR OUTPUT	Output of oscillator. It is normally connected to attenuator input with RG-58 cable.
ATTENUATOR INPUT	Input to attenuator.
VERNIER	Provides 0-10 db. of vernier attenuation.
TOGGLE SWITCH	Provides indicated amounts of attenuation.
METER	Indicates the voltage supplied to the Toggle switch steps and is controlled by the vernier attenuation.

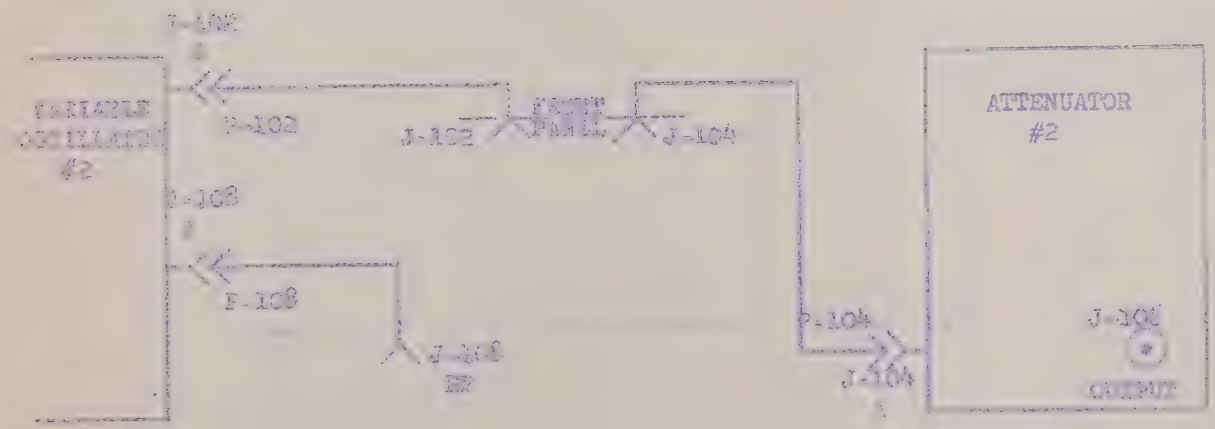
BY REMOVING JUMPER CABLE FROM OSCILLATOR OUTPUT TO THE ATTENUATOR INPUT THE ATTENUATOR AND THE METER CIRCUIT CAN BE USED FOR ATTENUATING ANY RF SIGNAL APPLIED TO THE ATTENUATOR INPUT. THE POWER SWITCH CAN BE TURNED OFF FOR THIS APPLICATION.

OSCILLATOR 2	This unit is identical with OSCILLATOR 1.
PILOT LIGHT	Use #47 bulb for replacement.
POWER ON/OFF	A.C. power switch.

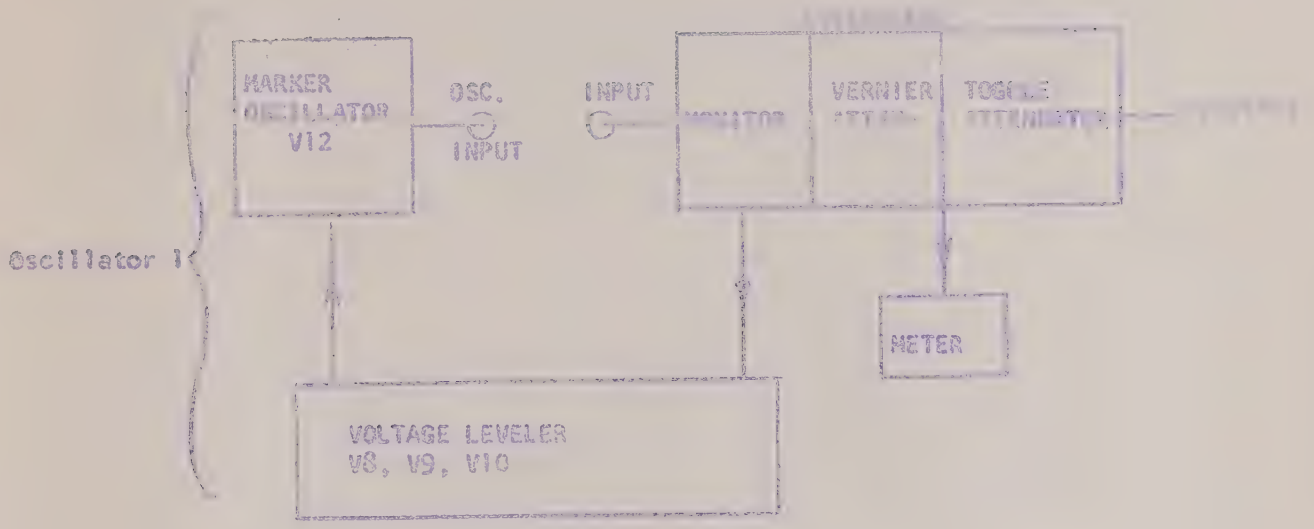

VARIABLE OSCILLATOR
METER
NO. 2
VARIABLE OSCILLATOR
NO. 1
V1
6J6
V7
V6
12AX7
V5
12AX7

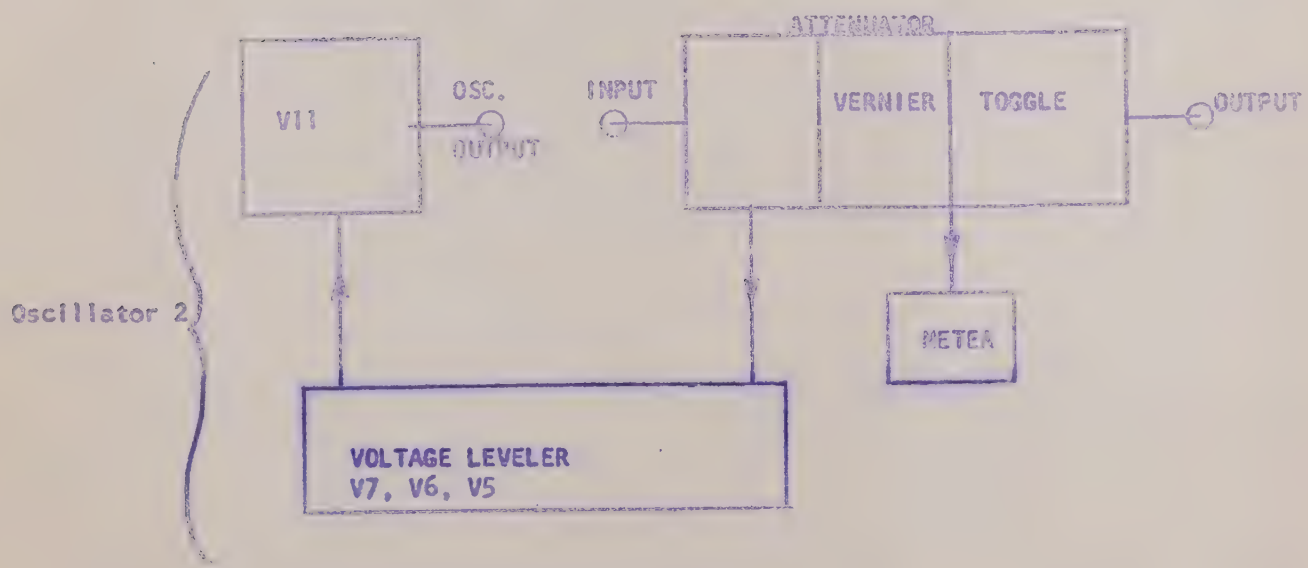
COAXIAL CABLE DIAGRAM FOR M5-X MARKER GENERATOR





BLOCK DIAGRAM





POWER SUPPLY
V1, V2, V3, V4

DESCRIPTION OF MODEL M5-X

This instrument serves the multi-purpose of providing two accurately calibrated, precise levels of CW signals and two variable markers when it is used in conjunction with the L5-X Sweep Generator.

The regulated B Plus supply to each oscillator is regulated in reference to the RF level supplied to the input of the attenuator. This method of regulation insures a constant RF level and is not influenced by line voltage fluctuations. Only a slight change in output will occur as the oscillator is tuned over the range.

The output levels may be changed by adjusting the LEVEL controls on the rear panel. These controls are normally set for just over 1 volt maximum output.

RF OSCILLATORS

The two diodes at the input of the attenuator, monitor the RF level. This voltage is the feed back to the leveler, thus the uniformity of the output is dependent upon the accuracy with which these diodes respond to the RF level. Since both the positive and the negative portions of the RF envelope contribute to the DC output, the monitoring accuracy is improved over the usual single diode, half wave detector used in many signal generators.

The second set of diodes, which are connected to the meter, monitor the RF level after the vernier attenuator. Thus the meter indicates the effect of the vernier attenuator and the vernier attenuator can be used to set a reference level. With the reference level set at .224 volts RMS, all attenuation steps would be read as -0DM. Likewise, with the reference set at 1.0 volts RMS, the output could be read as DB or in microvolts (ie. 20 db = .1 volt 40 db = 10 millivolts etc. as indicated on the following chart).

The meter may be calibrated to a standard power measuring device by adjusting of the series potentiometer (marked METER adj. on rear panel).

Sweep oscillator and attenuator input receptacles are provided on the front panel so that either the oscillator or the attenuator may be used separately.

OSCILLATOR OUTPUTS

In addition to the full CW output, lower RF levels are also provided for use with the L5-X generator to produce markers.

DB/VOLTAGE EQUIVALENT

DB	VOLTS RMS
0	1.00
1	.89
2	.79
3	.71
4	.63
5	.56
6	.50
7	.45
8	.40
9	.35
10	.32
11	.28
12	.25
13	.22
14	.20
15	.18
16	.16
17	.14
18	.13
19	.11
20	.10

DB	MILLIVOLTS RMS
21	89
22	79
23	71
24	63
25	56
26	50
27	45
28	40
29	35
30	32
31	28
32	25
33	22
34	20
35	18
36	16
37	14
38	13
39	11
40	10
41	8.9
42	7.9
43	7.1
44	6.3
45	5.6
46	5.0
47	4.5
48	4.0
49	3.5
50	3.2
51	2.8
52	2.5
53	2.2
54	2.0
55	1.8
56	1.6
57	1.4
58	1.3
59	1.1
60	1.0

DB	MICROVOLTS RMS
61	890
62	790
63	710
64	630
65	560
66	500
67	450
68	400
69	350
70	320
71	280
72	250
73	220
74	200
75	180
76	160
77	140
78	130
79	110
80	100
81	89
82	79
83	71
84	63
85	56
86	50
87	45
88	40
89	35
90	32
91	28
92	25
93	22
94	20
95	18
96	16
97	14
98	13
99	11
100	10
101	8.9
102	7.9
103	7.1
104	6.3
105	5.6
106	5.0
107	4.5
108	4.0
109	3.5
110	3.2

DB	MICROVOLTS RMS
111	2.8
112	2.5
113	2.2
114	2.0
115	1.8
116	1.6
117	1.4
118	1.3
119	1.1
120	1.0
121	.89
122	.79
123	.71
124	.63
125	.56
126	.50
127	.45
128	.40
129	.35
130	.32
131	.28
132	.25
133	.22
134	.20
135	.18
136	.16
137	.14
138	.13
139	.11
140	.10

PARTS LIST - M5-X

TUBES

CIRCUIT REF. #	TYPE	DESCRIPTION
V1	5Y3GT	B+ Supply
V2	6X4	B- Rectifier
V3	OB2	Negative Voltage Regulator
V4	OB2	Positive Voltage Regulator
V5	12AX7	Leveler Amplifier (Oscillator #2)
V6	12AX7	" " " "
V7	EL84/6BQ5	Oscillator #2 Control
V8	12AX7	Leveler Amplifier (Oscillator #1)
V9	12AX7	" " " "
V10	EL84/6BQ5	Oscillator #1 Control
V11	6J6	Variable Oscillator #2
V12	6J6	Variable Oscillator #1

DIODES

CIRCUIT REF. #	DESCRIPTION
D401	1N34 Meter # 1 Diode
D402	1N34 " " " "
D403	" Leveler # 1 Monitor Diode
D404	" " " " " "
D701	" Meter # 2 Diode
D702	" " " "
D703	" Leveler # 2 Monitor Diode
D704	" " " " " "

CAPACITORS

CIRCUIT REF. #	DESCRIPTION
C1a	10 mf.-450 V Electrlytic Capacitor (Filter)
C1b	80 Mf.-450 V " " "
C101	5 mf.-450 V
C102	30 mf.-250 V
C103	30 mf.-150 V
C104	5 mf.-150 V
C105	5 mf.-150 V
C301	10 mmf. Disc.
C302	10 mmf. Disc.
C303	175 mmf. Dual Tuning Capacitor
C304	1000 mmf. Feed thru
C305	" " " "
C306	" " " "
C307	" " " "
C401	5 mmf. Disc.
C402	15 mmf. Disc
C403	1000 mmf. Disc
C404	.01 mf. Disc

PARTS LIST - M5-X

RESISTORS (CONT)

CIRCUIT REF. #	DESCRIPTION
R430	437 ohm, ½ W
R431	" " " "
R432	" " " "
R433	" " " "
R434	11.6 ohm, ½ W
R435	" " " "
R436	" " " "
R437	870 ohm, ½ W
R438	" " " "
R439	5.8 ohm, " "
R440	39 K, " "
R501 to R511	Same as R201 to R211
R601 to R604	Same as R301 to R304
R701 to R740	Same as R401 to R440

POTIOMETERS

CIRCUUT REF. #	DESCRIPTION
VR201	5 K Level Control R. P.
VR401	100 ohm Vernier Attenuation F. P.
VR402	50 K Meter Adjust R. P.
VR501	5 K Level Control R. P.
VR701	100 ohm Vernier Attenuation F. P.
VR702	50 K Meter Adjust

SWITCHES

CIRCUIT REF. #	DESCRIPTOON
S1	S. P. S. T. 3 amp F. P.
All attenuator switches	D. P. D. T.

TRANSFORMER

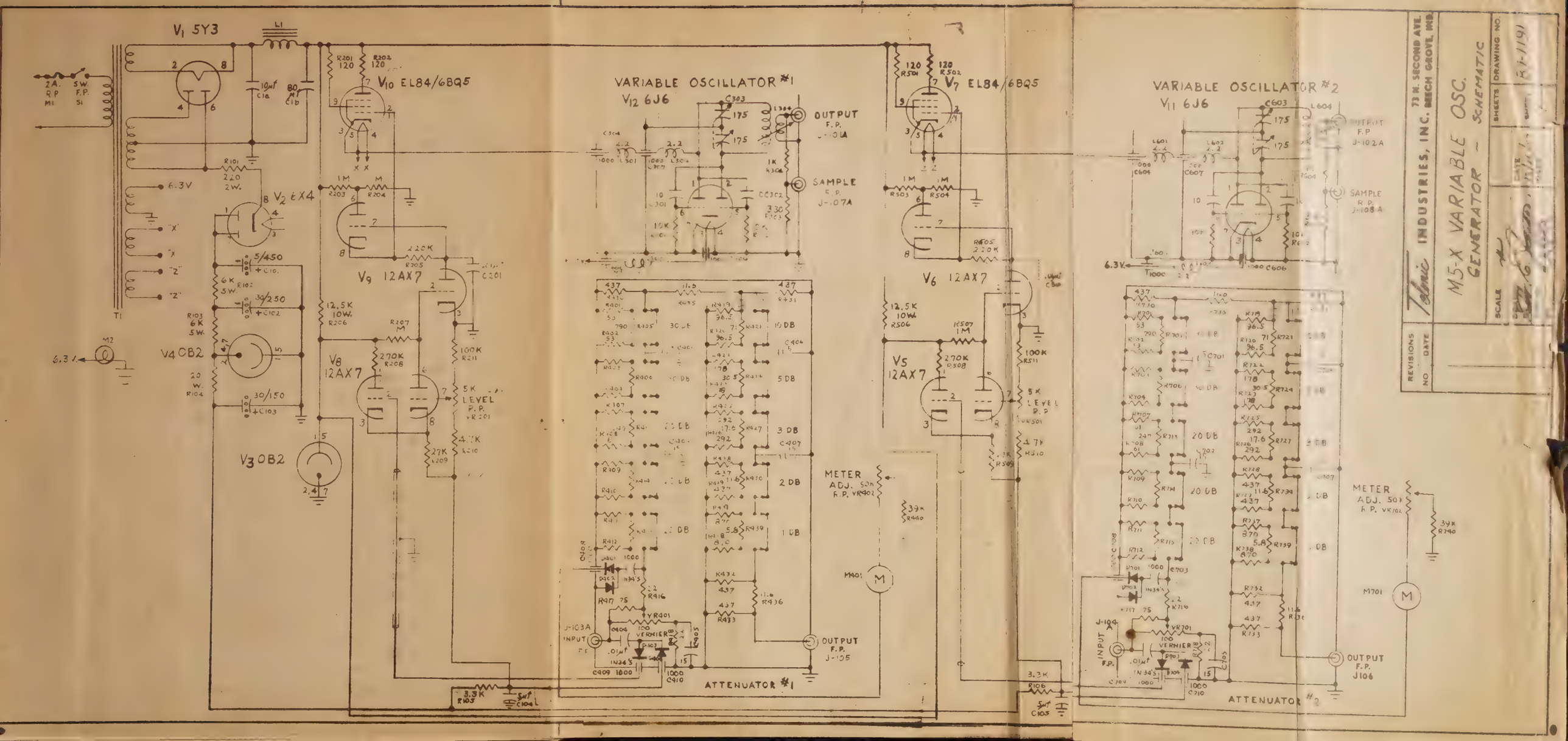
CIRCUIT REF. #	DESCRIPTION
T1	Power Transformer

COILS

CIRCUIT REF. #	DESCRIPTION
L1	Filter Choke
L301	2.2 mh
L302	" "
L303	" "
L304	Oscillator tuning coil and output coupling
L601 to L604	Same as L301 to L305

MISCELLANEOUS

CIRCUIT REF. #	DESCRIPTION
M1	Fuse 2 amp F. P.
M2	#47 Pilot Light
M3	" " "
M4	7 mc. Crystal


V1 5Y3
V10 EL84/6BQ5
V2 6X4
V9 12AX7
V4 0B2
V8 12AX7
V3 0B2
VARIABLE OSCILLATOR #1
V12 6J6
OUTPUT F.P. J-101A
SAMPLE F.P. J-107A
V7 EL84/6BQ5
V6 12AX7
V5 12AX7
VARIABLE OSCILLATOR #2
V11 6J6
OUTPUT F.P. J-102A
SAMPLE F.P. J-108A
METER ADJ. 50K F.P. VR402
METER ADJ. 50K F.P. VR702
ATTENUATOR #1
ATTENUATOR #2
INPUT F.P. J-103A
OUTPUT F.P. J-105
INPUT F.P. J-104
OUTPUT F.P. J106
73 N. SECOND AVE.
INDUSTRIES, INC. BEECH GROVE, IND.
M5-X VARIABLE OSC.
GENERATOR - SCHEMATIC
SCALE
DRAWING NO.
SHEETS
REVISIONS
NO DATE

WARRANTEE

All material and workmanship in this instrument are guaranteed to be free from defects (with the exception of vacuum tubes) for one year from the date of purchase. This warrantee does not apply if the unit has been altered, improperly handled or damaged in any way beyond our control.

RETURNING EQUIPMENT TO FACTORY

Factory service is available for repair and readjustment of this instrument. However, a description of the trouble plus the model and serial number of the unit should be forwarded first, whereupon instructions for correcting the trouble or authorization for returning the equipment will be given. This applied to all units whether under warrantee or not.

SWEEP GENERATORS FOR TESTING AND ALIGNMENT OF

- BROADBAND F.M. DISCRIMINATORS
- R.F. TUNING DEVICES
- I.F. AMPLIFIERS
- MATCHING DEVICES
- RADAR, TELEMETERING
- RADIO, TELEVISION
- ANTENNAS
- R.F. SWITCHING DEVICES
- KLYSTRON TUBES
- NEW TUBE DESIGNS
- DELAY LINES
- TRANSMISSION LINES
- DEMODULATORS
- R. F. MIXERS
- R.F. FILTERS
- DISTRIBUTION SYSTEMS
- TRANSISTORS

FOR MEASUREMENT AND INDICATION OF

Gain	Coupling
Bandwidth	Leakage
Frequency Range	Attenuation
Frequency Response	Mechanical Faults
Spurious Response	Noise
VSWR	Efficiency

Telonic INDUSTRIES, INC.

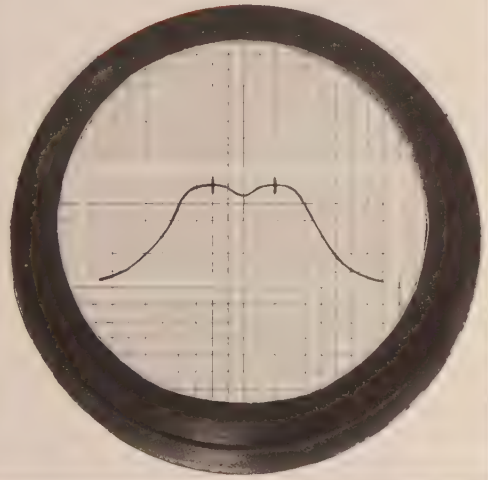
Telonic designs and manufactures

SWEEP GENERATORS

Featuring

High Signal Level
Low Leakage
Flat Output
Low Source VSWR
Accurate Marker Systems

MANY MODELS—Many frequency ranges



To facilitate your requests for quotations and orders, a handy form may be obtained from your field engineer or from TELONIC.

Telonic INDUSTRIES, INC.
BEECH GROVE, INDIANA
TWX—IP-254 Phone—STate 6-9239

THESE BASIC MODELS use sweep oscillators operating at fundamental frequency and are available in many ranges up to the limit of the standard receiver-type tube (6AF4A) and tuned-line circuitry. The listed models illustrate the ranges and sweep widths that may be obtained. *High outputs*, exceptional *uniformity* (flatness) and *purity* (freedom from harmonic and spurious content) are prime features of these models.

The model 200 series are fixed-tuned and sweep the entire range. This series is particularly useful for checking tuning devices, antennas, transmission line, broad-band amplifiers, and in making VSWR measurements, etc. The wide sweep technique is a new and powerful tool for *designing* as well as for *production*.

Deluxe Model S5-DT
Bench Style

THE SWEEP OSCILLATOR circuitry is contained in a tightly-shielded compartment that almost completely eliminates radiation. The precision vibrating capacitor consists of a silver-plated beryllium copper diaphragm. This all-metal unit has no tendency to warp or fatigue. The exceptionally long-life of this wobbulator is one of the reasons for the low maintenance cost of Telonic sweep generators.

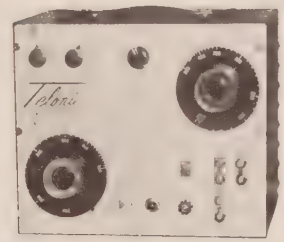
OUTPUT LEVELING circuitry, using the same technique as in almost all regulated D.C. power supplies, is largely responsible for the high degree of flatness obtained in all Telonic sweep generators.

ORDERING INFORMATION

Designate model by adding appropriate symbols.

- S5 —Basic unit—portable style.
- S5-T —with TA-50 attenuator—portable style.
- S5-FT —with 4 plug-in fixed markers and attenuator—portable style.
- S5-CT —with 4 plug-in crystal-controlled markers and attenuator—portable style.
- S5-MT—with variable marker and attenuator—portable style.
- S5-DT —Complete marker system, attenuator — bench style.

ALL FUNDAMENTAL FREQUENCY



Model S5-MT
Portable Style

MASTER LINE—Tunable and Fixed SWEEP GENERATORS

	SWEEP Range	Sweep Width
[illegible]	100-200 mc.	30%
[illegible]	175-350 mc.	15%
[illegible]	225-500 mc.	10%
[illegible]	440-920 mc.	6%
[illegible]	950-1250 mc.	4%
[illegible]	260-440 mc.	180 mc.
[illegible]	325-500 mc.	175 mc.
[illegible]	500-750 mc.	250 mc.
[illegible]	650-950 mc.	300 mc.
[illegible]	800-1200 mc.	400 mc.
[illegible]	900-1250 mc.	350 mc.
[illegible]	1200-1400 mc.	200 mc.
[illegible]	50-90 mc. 160-220 mc.	40 mc. 60 mc.

Output—Over 1 volt p. to p.
Impedance—50 ohms
Flatness—5% at max. sweep width
Vernier Attenuation—0-approx. 20 db.

(See general specs. and features on back page)

ATTENUATOR AND MARKER SYSTEMS

Type	Description
"T"	TA-50 Attenuator
"F"	4 plug-in fixed markers. Each adj. over wide range. Stability better than .1%.
"C"	4 plug-in crystal-controlled markers with .005% accur. Available for sweep ranges to approx. 600 mc.
"M"	Variable, individually calibrated marker with .25% accur. covering full sweep range.
"D"	6 plug-in fixed or crystal-controlled markers; variable marker; 10 mc. harmonic marker.

(The "F" "C" - "M" & "D" systems include Birdy-By-Pass circuitry)

ULTRA RANGE SWEEPS H-1, H-2, H-3

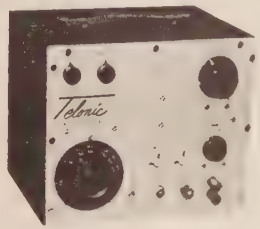
ULTRA WIDE SWEEP WIDTHS are obtained by heterodyning two UHF oscillators whose construction is similar to that of the MASTER LINE units (6AF4A tubes operating at below 1000 mc.) The high signal level of the oscillators and the use of balanced mixer circuitry result in a stable, high level output.

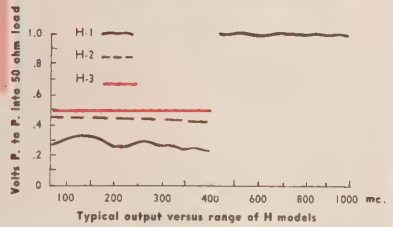
THE TELONIC H-1 is similar to the MASTER LINE Model S3A-T, but, in addition to the fundamental range of 380-900 mc., it has a heterodyne range of 1-380 mc. The output of a fixed oscillator at 500 mc. is mixed with the UHF signal to provide the low range.

Ranges—1-380 mc. and 380-900 mc.
Sweep Width—250 kc-40 mc.
Flatness—HI range—5% at maximum sweep width
LO range—5% at sweep width of 10 mc.
Output—HI range— 1 v. p. to p.
LO range—.2 v. p. to p.
Impedance—50 ohms
Attenuator—TA-50 (See Atten. specs.)
Vernier Atten.—0 to over 10 db.
Style—Portable

(See general specs. and features on back page)

Model H-1

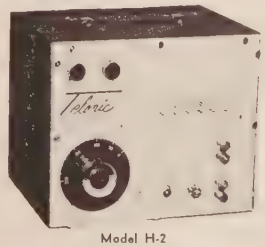




Typical output versus range of H models

THE TELONIC H-2 and H-3 achieve very wide sweep widths by heterodyning *TWO SWEEP OSCILLATORS*. Since they are sweeping 180° out of phase with each other, the sweep widths are additive. The output leveling circuit maintains a flat output over the entire range. Tuning one oscillator tunes the center frequency of the heterodyne output, and varying the drive voltage of both wobbulators varies the sweep width.

These unique instruments are very useful in the designing and testing of broad-band video, IF, and RF amplifiers, filters, impedance matching devices, etc.

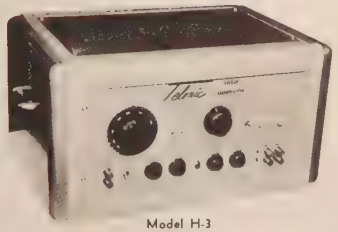


Model H-2

SPECIFICATIONS

	H-2	H-3
Center Frequency—	1-200 mc.	1-200 mc.
Sweep Width—	200 kc-200 mc.	200 kc-200 mc.
Output—	.4 v. p. to p.	Over .5 v. p. to p.
Impedance—	50 ohms (or 75)	50 ohms (or 75)
Flatness—	15% to 150 mc. 20% to 300 mc.	15% to 300 mc.
Attenuation—	Toggle Switch 20,20, 10,6,3, db & vern. 0-10 db.	TA-50 (or TA-75) & vern. 0-10 db.
Marker—	External marker input only	6 Markers—Type "C" or "F" and Birdy-By-Pass System
Style—	Portable	Bench

(See general specs. and features on back page)



Model H-3

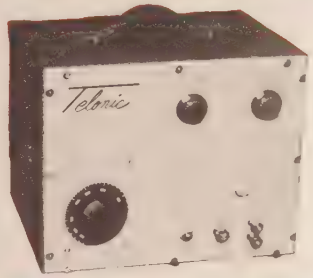
EXTENDED RANGE SWEEPS

A series of instruments covering the range of 950-2300 mc. is accomplished by a new sweep generator design. Broad frequency coverage and wide sweep widths are obtained without resorting to the more complicated techniques normally used at these frequencies. A TELONIC MASTER LINE UHF sweep oscillator, a harmonic generating crystal and high-pass filter provide a high level, spurious-free signal at twice the frequency of the oscillator. Voltage leveler circuitry maintains constant output.

This new line of sweep generators is available with fixed or tunable center frequencies and with or without marker systems. The standard MASTER LINE Marker systems are available.

Output—.5 v. p. to p. into 50 ohms
Impedance—50 ohms—Type "N" Conn.
Flatness—10% on tunable models
15% on fixed models
measured at max. sweep width
Attenuation—Vernier atten. 0-20 db.

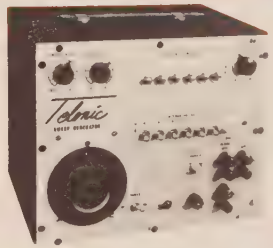
(See general specs. and features on back page)



Model E2

Models	Range	Sweep Width
E1	920-1400 mc.	0-50 mc.
E2	1200-2000 mc.	0-50 mc.
E3	1700-2300 mc.	0-50 mc.
E201	1000-1400 mc.	400 mc.
E202	1400-1800 mc.	400 mc.
E203	1700-2300 mc.	600 mc.

ELECTRONIC SWEEPS



These ultra flat sweep generators are swept electronically using a saturating reactance. Continuous tuning is accomplished by means of a precision variable capacitor.

Toggle switches and constant impedance resistive pads provide a very convenient and accurate means of attenuation.

The performance of these models approaches perfection—output is well over 1 volt, flatness better than 5%. There is very low spurious and harmonic content and the leakage is so low that even high gain Radar IF strips are unaffected.

Model	Center Freq.	Sweep Width
L1	450-1800 kc.	0-100%
L2	1.5-5.0 mc.	0-100%
L3	5-15.0 mc.	0-50%
L4	10-25 mc.	0-50%
L5	25-70 mc.	0-40%
L6	50-125 mc.	0-30%

Output—well over 1 volt p. to p.
Impedance—50 ohms
Attenuation—Toggle switch 20,20,20,10,6,3 db. & vernier atten. 0-10 db.
Flatness—Within 5% over max. sweep width

(See general specs. and features on back page)

Add "C" to Model No. for Xtal Marker system employing 6 plug-in crystal-controlled markers and Birdy-By-Pass circuitry—i. e. L1-C
Add "M" for Variable Marker and Birdy-By-Pass circuitry—i. e. L1-M
Add "D" for Deluxe instrument with 6 plug-in markers, variable marker, harmonic marker, and Birdy-By-Pass circuitry—i. e. L1-D

Telonic VHF Sweep-Marker Generators

Bulletin 203

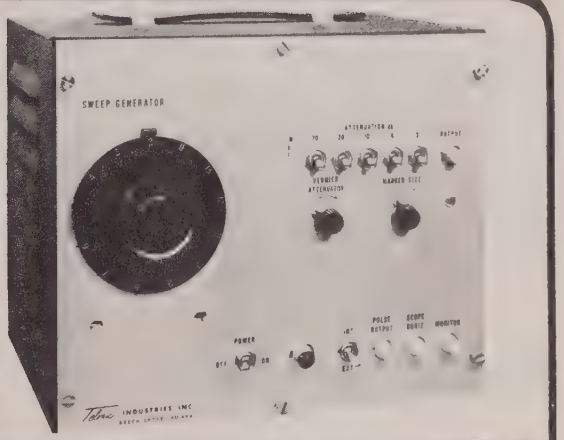
FOR TV PRODUCTION, ENGINEERING, SERVICING

TELONIC sweeps are being used by a majority of the TV equipment manufacturers, including RCA, GE, Admiral, Oak, and GI. The features that are making them so popular are their excellent specifications (flatness, high output, wide sweep, etc.), efficient design (compact size and shape, simplicity of operation, accessibility for easy servicing), outstanding performance (dependability, low maintenance), and the *ability of TELONIC to modify standard specifications to meet individual needs.*

Obsolete installations are being replaced with TELONIC units to increase production efficiency, reduce maintenance costs and to improve the quality of the product.

New!

Model SV-6



The new model SV-6 supersedes all previous models, SV-3, SV-3A and other special modifications that have been made available previously. It has the same basic circuits and convenient sub-chassis layout, but has improved electrical characteristics and a new panel arrangement. BNC connectors are used for greater convenience and standardization of connecting cables, as well as elimination of noise and hum pick-up that can occur when binding posts are used.

An engraved black anodized dial is standard on this model.

The flatness of this series is held to less than 5% over the entire sweep width, and to 1 or 2% between markers. A voltage doubler detector circuit monitors the complete RF output envelope. A three stage high gain DC-coupled amplifier amplifies any deviation and compensates for it by instantaneously changing the B+ to the sweep oscillator.

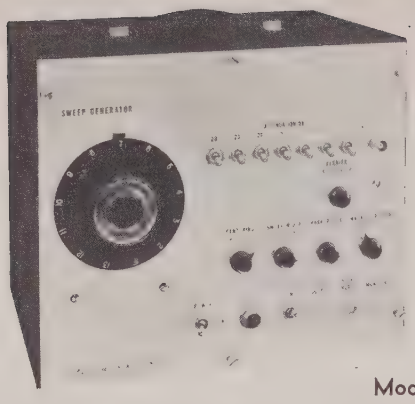
This method of producing a flat output has excellent long and short time stability and is unaffected by aging of parts and line voltage fluctuations.

Sweeping is accomplished electronically by magnetically saturating a ferrite core and thus changing the inductance of the oscillator tank circuit. The particular type of ferrite used has characteristics that produce a very linear change of frequency. This 13-position sweep generator uses a separate crystal on each channel to produce 2 pulse markers, one on the video and one on the sound frequencies. A special circuit forms pulses with much greater accuracy and stability than the usual multivibrator method. The positive pulse output is available on the front panel to be used to produce intensity markers or as sharp rectangular spikes, independent of the device under test, when connected to the CRT deflection plates.

Special features of this compact VHF-TV sweep and marker generator are: electronic sweep; 25 mc. sweep width; hi-level, flat output; special crystal-controlled pulse markers, and removable sweep and marker subchassis. Solid silver switch section contacts and clips are used for long switch life.

CONDENSED SPECIFICATIONS

Range—12 channels & 43 mc. I.F.
Sweep Width—25 mc. adjustable
Output—Well over 1 v. p. to p. into 75 ohms
Impedance—75 ohms (300 ohms balun included with each instrument)
Flatness—5% over each channel (2% between markers) 10% over all
Attenuation—20,20,10,6,3 & 10 db. vern. atten.
Markers—Pulse-type markers on video and audio
Style—Portable



Model SV-6AG

OPTIONAL FEATURES

A **An attenuator having steps of 20, 20, 20, 20, 10, 6, 3.** Other combinations of values not higher than 20 db each and not over 7 steps may be ordered.

B **A dual attenuator having steps of 20, 20, 10, 6, 3, db on each section.** The input of each attenuator is common. This arrangement is used to make connections to fixture for both IF and RF testing of TV front ends and for dual trace presentation for comparison to a standard unit.

C **An extra marker on the IF position.** One or sometimes two of these crystal controlled oscillators may be used to provide one or two markers in addition to the video and sound marker on the IF Channel.

D **Line voltage.** Special line voltage may be specified on standard American models.

E **RF output monitor.** A crystal diode circuit may be added at the output of the attenuator to indicate the RF level at that point. This is often used in making VSWR and impedance measurements.

F **Foreign specifications.** The *channel audio* and *sound marker* frequencies as well as line voltage and *frequency* specifications may be obtained.

G **Sweep width and centering panel controls.** These controls which are normally used as internal adjustments may be installed on the front panel. This is desirable for engineering use.

H **Sine wave sweep.** A sinusoidal sweep voltage may be substituted for the normal sawtooth which permits the use of the sine sweep present on some oscilloscopes.

S **Special features.** Other modifications, not mentioned above, may be requested.

ORDERING DATA

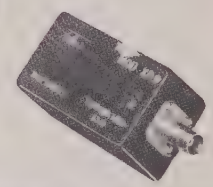
In ordering the SV-6 any of the following modifications may be specified. The modification letter, or letters, should be added to the model No. SV-6 (i.e., a unit with sweep width and centering controls on the front panel would be called SV-6G and a unit with this feature plus 40 db. additional attenuation would be called SV-6AG).

The above letter designations apply only to the Model SV-6

VHF ACCESSORIES

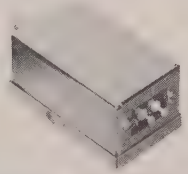
These detectors and balun are particularly recommended for use with Telonic VHF sweep generators.

RF DETECTORS



XD-9

VHF BALUN

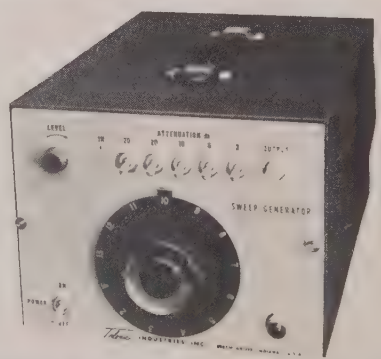


BA-1

SPECIFICATIONS	XD-9	XD-10	BA-1
Frequency range	1—250 mc.	1—250 mc.	Channel 2—13
Impedance	75 ohms	300 ohms balanced	75 to 300 ohms
Connector	BNC input BNC output	Special input BNC output	BNC input Special output
VSWR	1.2:1	1.2:1	1.2:1

MODEL SV-2

The SV-2 has the wide, flat, sweep characteristics of the SV-6, but has no marker system or horizontal output. Since the sweep is sinusoidal, the 60-cycle sine sweep present in many oscilloscopes is used.



Telonic INDUSTRIES, INC.
75 NORTH SECOND AVE.
BEECH GROVE, INDIANA

Telonic TELEVISION TRIO

FOR TV PRODUCTION, ENGINEERING, SERVICING

TELONIC sweeps are being used by a majority of the TV manufacturers. The features that are making them so popular are their excellent specifications (flatness, high output, wide sweep, etc.) efficient design (compact size and shape, simplicity of operation, accessibility for easy servicing); outstanding performance (dependability, low maintenance); and the *ability of TELONIC to modify standard specifications to meet individual needs.*

Obsolete installations are being replaced with TELONIC units to increase production efficiency, reduce maintenance costs and to improve the quality of the product.

UHF

Model S3A-FT

The S3A-FT is an ideal UHF TV test instrument that has high level, flat output, wide sweep, four plug-in fixed adjustable markers with Birdy-By-Pass system and a precision Step-Attenuator. A four position detent system as shown above is also available. (Specify DT-4 detent system if desired.)

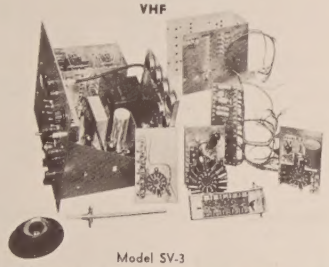
- Range—440-920 mc.
- Width—0-50 mc. at 500 mc.
- Output—Well over 1 v. p. to p. into 50 ohms
- Flatness— 5% over max. sweep
  15% over entire range
- Attenuation—TA-50 & vernier atten. 0-10 db.
- Markers—4 Plug-in Fixed markers with Birdy By-Pass system
- Style—Portable

(See general specs. and features on back page)

IF

Model L5A-P

VHF



Model SV-3

This 13-position sweep generator uses a separate crystal on each channel to produce 2 pulse markers, one on the video and one on the audio frequencies. A special circuit forms pulses with much greater accuracy and stability than the usual multivibrator method.

Special features of this compact VHF-TV sweep and marker generator are: electronic sweep; 25 mc. sweep width; hi-level, flat output; special crystal-controlled pulse markers; and removable sweep and marker sub-chassis.

- Style—Portable
- Range—12 channels & 43 mc. I.F.
- Sweep Width—25 mc. adjustable
- Output—Well over 1 v. p. to p. into 75 ohms
- Impedance—75 (300 ohms balun supplied) ohms
- Flatness—5% over each channel—10% over all
- Attenuation—20,20,20,10,6,3 & 10 db. vern. atten.
- Markers—Pulse-type markers on video and audio
- Style—Portable

(See general specs. and features on back page)

This TV IF sweep, Model L5A-P, and crystal-controlled marker generator is a variation of an L Model. 6 crystals are used in passive networks to accurately key pulse markers.

- Center Frequency—35-55 mc.
- Sweep Width—4-15 mc.
- Output—1 v. into 75 ohms
- Attenuation—20,20,20,10,6,3 and 10 db. vernier atten.
- Markers—6 Crystal—controlled pulse-type markers
- Style—Portable

(See general specs. and features on back page)

Telonic RF ACCESSORIES

RF ATTENUATORS 0-1000 mc.

TURRET

TA-50, TA-75

Attenuation—0,10,20,30,40, 50 db.
Size—2⅛" x 1¾"

TB-50, TB-75

Attenuation—0,1,2,3,4,5,6, 7,8,9,10,20 db.
Size—3" x 1¾"

- Impedance—50 or 75 ohms
- VSWR—1.2:1 to 500 mc.
  1.3:1 to 1000 mc.
- Shaft—2" x ¼" round
- Accuracy—.25 db. on all steps to 10 db.
  .5 db. on higher steps
- Connectors—BNC
- Power—½ watt average, 1 kw peak
  (Mounts like a potentiometer)

DECADE

TAD-50
TAD-75

Two 6-position and 12-position attenuators arranged in decade allow any combination up to 110 db. in 1 db. steps.

- Attenuation—0-110 db.
- Impedance—TAD-50—50 ohms
  TAD-75—75 ohms
- VSWR—1.2:1 to 500 mc.
  1.3:1 to 1000 mc.
- Accuracy— .25 db. to 10 db.
  1.25 db. to 110 db.
- Size—9½" x 3" x 4¾"

TOGGLE SWITCH ATTENUATORS—Several models available—up to 100 db. in 1 db. steps—Range—DC—200 mc.
Also, Toggle Switch Attenuators built to order. Write for complete information.

RF DETECTORS

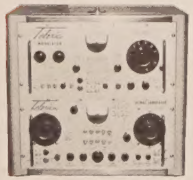
- Frequency Range—1-1000 mc.
  (useful to 2500 mc.)
- VSWR—1.05:1 to 500 mc.
  1.1:1 to 750 mc.
  1.2:1 to 1000 mc.

Small, black anodized aluminum block. Easily-replaced crystal.

Models	Imped.	Connectors
XD-3	50 ohms	BNC
XD-4	75 ohms	BNC
XD-5	50 ohms	N

NEW Telonic INSTRUMENTS

RADAR TEST SET



MOD. SSX-1/PAM-1

Complete signal source for testing Radar IF strips
Includes: AUDIO — 50 WATT VIDEO PULSE — C.W. PULSE — C.W. — MODULATED C.W. — R.F. SWEEP — VARIABLE MARKER — CRYSTAL HARMONIC MARKER.
(Detailed spec. sheet available from Telonic or Telonic representatives)

DOUBLE RANGE SWEEPS

A new "double" range sweep generator is now available. This multi-purpose unit includes two sweeping oscillators—one wide-band fixed tuned oscillator and the other a normal tunable sweep oscillator covering the same frequency. Frequency ranges, styles, and markers of either the Master Line or the Extended Range may be provided.

Model is designated by combining the number of the standard tunable and fixed sweeps. (I.E.: E3-203-D)

WORLD-WIDE SALES REPRESENTATIVES

These experienced field engineers are available to help you. Please call on them to discuss your needs.

EAST

Baltimore—H. L. Hoffman & Co., 310 E. 25th St.
Phone—BElmont 5-8073

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Phone—Englewood 3-1012

Lynn, Mass.—H. L. Hoffman & Co., 113 Monroe St.
Phone—Lynn 8-1710

Abington, Penna., (Philadelphia)—H. L. Hoffman & Co., 1468 Old York Rd., Phone—TUrner 4-9900

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Westbury, L. I., N. Y.—H. L. Hoffman & Co., 804 Newbridge Ave.
Phone—EDgewood 4-5600 TWX—Westbury, N. Y. 118

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Phone—WAlnut 5-6464 TWX—IP-263

Dayton, Ohio—Electro Sales Associates, 512 Orangewood Drive
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Albuquerque, New Mexico—Industrial Associated Electronics, 419 Central Ave., N.W. Phone—3-3585

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Phone—WEbster 8-2565

San Mateo, Calif.—G. E. Moxon Sales, 422 La Jolla Ave.
Phone—FIreside 5-2866

For information relative to sales outside United States contact Telonic.

Telonic
INDUSTRIES, INC.
BEECH GROVE, INDIANA

CATALOG 7A

Telonic

SWEEP AND MARKER GENERATORS TO 2400 mc.

Complete Catalog

BEECH GROVE, INDIANA

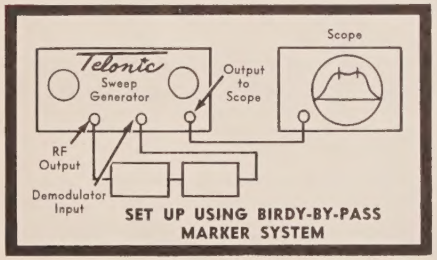
DESCRIPTION OF MARKER SYSTEMS

BIRDY-BY-PASS

The Birdy-By-Pass marker system is standard on the MASTER LINE, H-3, EXTENDED RANGE, and the ELECTRONIC SWEEP models.

In this system, beat or birdy pips are produced by mixing a sample of the sweep oscillator signal with the marker output; the "birdies" are fed through an amplifier and are added to the demodulated sweep signal before it is connected to the scope vertical amplifier. The markers completely bypass the device under test.

Since the markers are produced directly, no frequency error can occur other than in the marker oscillator itself. Thus, the error that is present in the pulse system, due to keying of the multivibrator, is avoided. In addition to its major features—accuracy, stability and versatility, it has the advantage of simplicity, allowing this system to be used on the Portable style models.



SET UP USING BIRDY-BY-PASS MARKER SYSTEM

CABINET STYLES

PORTABLE STYLE

The Portable Style is particularly appropriate in applications where space is at a premium. The cabinet measures only 10″ x 12″ x 9½″ and weighs approx. 25# (Shpg. wt 40# approx.) Louvers on the sides and perforated panels on the top provide ventilation. Leather handle and the compact size allow for easy-carrying. This style is used on standard Telonic sweep generators, except the H-3 and Deluxe models.

BENCH STYLE

The Bench style is used on Deluxe models and H-3 and provides ample panel and chassis space for combination marker systems and extra features. The studio-type cabinet measures 23″ x 16″ x 13″. These models weigh approx. 50# (Shpg. wt. 100# approx.) Chrome-plated handles are provided on each side. The back is partially open and the top and bottom are removable for easy servicing and adjustment of unit.

PLUG-IN MARKERS*

Plug-in markers of two types are available, either crystal-controlled oscillators with an accuracy of .005% or fixed oscillators adjustable over a wide range with a stability of .1%. Extra units may be obtained from TELONIC to provide for changing requirements.

*(*Designated by "C" for Crystal type; "F" for Fixed type)*

CALIBRATED VARIABLE MARKER*

A calibrated variable marker is available for nearly all ranges. They are individually calibrated and engraved to an accuracy of .25% at intervals spaced for best readability.

*(*Designated by "M" in Model No.)*

CRYSTAL-CONTROLLED HARMONIC MARKERS*

Crystal-controlled harmonic markers are available in Deluxe Models utilizing the Birdy-By-Pass marker system. Crystal oscillator and frequency multiplier circuitry produces markers at multiples of the crystal frequency. The following frequencies are available:

Above 1200 mc. — 20 mc.
Above 500 mc. — 10 mc.
Below 500 mc. — 5 mc.
Below 100 mc. — 2.5 mc.
Low Ranges — 1 mc.

FEATURES AND SPECIFICATIONS COMMON TO ALL MODELS

Zero Base Line—Return sweep is blanked
Horiz. Sweep Voltage—Sawtooth of approx. 40 volts peak to peak
Radiation—Less than 10 microvolts
Source VSWR—Normally below 1.2:1
Display Linearity—Better than 1.2:1
Power—115 v. 60 cps (50 cps available)

DT-4 Tuning Detent

A 4 position mechanism may be added to the sweep generator's tuning dial as a production aid. Each position is easily adjusted from the front of the instrument.